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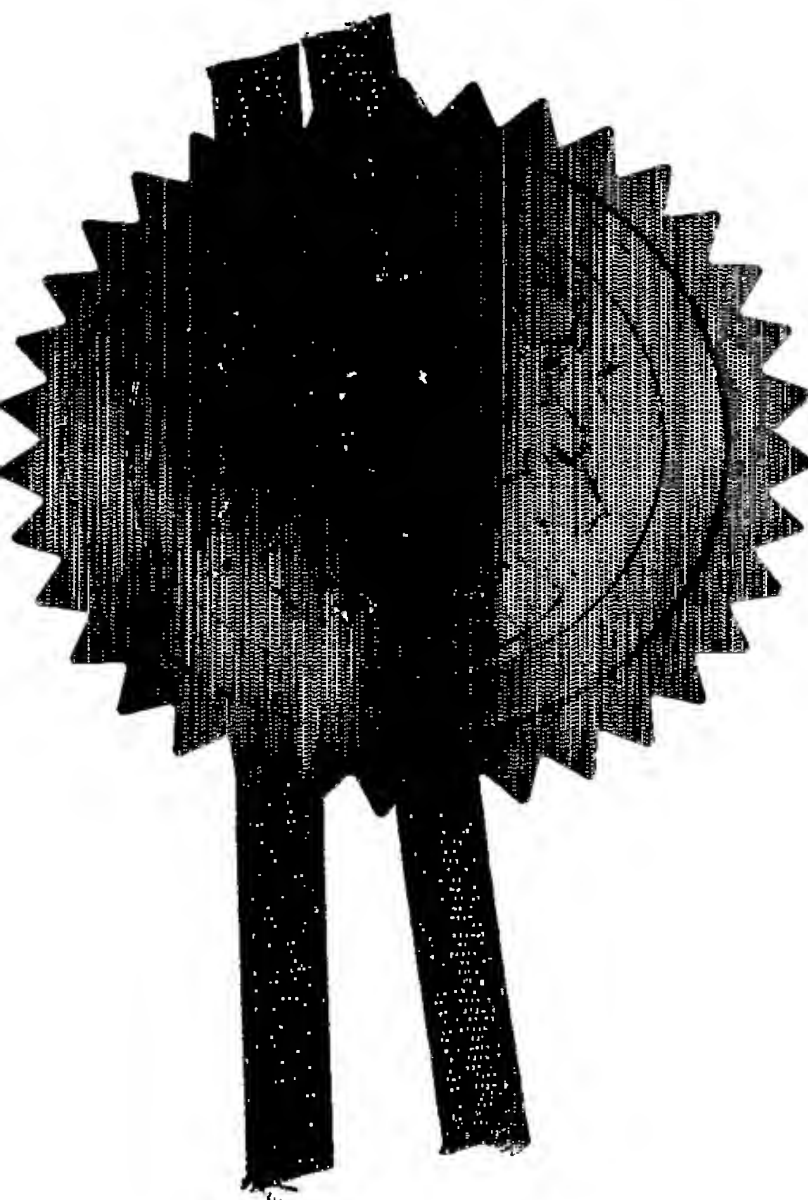
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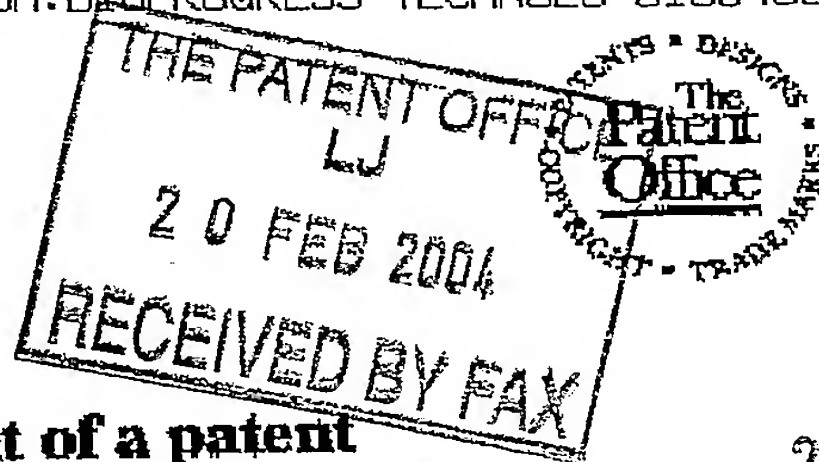
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FILMS FOR USE AS DOSAGE FORMS

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FILMS FOR USE AS DOSAGE FORMS

FIELD OF INVENTION

This invention relates to non gelatin film materials, for example, films of modified cellulose materials (or cellulose derivatives), and the incorporation of one or more active ingredients.

This invention further relates to film products and methods of preparation thereof and includes associated processes for the incorporation of substances into a film matrix.

Films thus prepared may be administered orally or otherwise internally or epidermally, or indeed in any manner where it can release one or more active ingredients either rapidly or at a controlled rate.

The administrable form may comprise a matrix which contains at least one water-soluble polymer in the form of a film in addition at to least one active ingredient to produce a therapeutic, organoleptic or cosmetic effect.

BACKGROUND OF THE INVENTION

As an alternative to tablets and pills, films may be used to carry active ingredients such as drugs, pharmaceuticals, and the like. However, historically films and the process of making drug delivery systems therefrom have suffered from a number of unfavorable characteristics that have not allowed them to be used in practice.

Water-soluble films cast from aqueous solutions containing medications can suffer from the aggregation or conglomeration of particles. Self-aggregation of any active ingredient will make the film inherently non-uniform in its composition. If such films were to include low dosages of an active ingredient, it is possible that portions of the film may be substantially devoid of any e.g. medication.

Furthermore, conventional film casting employs the use the time-consuming drying equipment such as a high-temperature air-bath, drying ovens, drying tunnels, vacuum driers, or other such drying equipment. The long length of drying time aids in promoting the aggregation of the active ingredient and/or other adjuvant. Such process also run the risk of exposing the active ingredient, i.e., a drug or vitamin or other components to prolonged exposure to moisture and elevated temperatures, which may render it ineffective or even harmful.

In an example, where the film is hot melt extruded, as in the case with HPC, then it could be difficult to mix an active ingredient into the film without degrading the active ingredient in some way.

Other factors, such as mixing techniques also play a role in the manufacture of films containing active ingredients or pharmaceuticals. During film solution preparation air is

often trapped in the solution and needs to be removed. This can result in the separation of actives which are suspended in the solution (a process commonly known as Froth Floatation) which in this instance would be undesirable. Additionally if trapped air is not removed then voids are produced in the film during the drying stage. The result is non-uniformity in the final film product.

An alternative to casting film solutions containing active ingredients is to surface coat the active ingredient onto a film substrate. This can result in a heterogeneous system where the active is poorly associated with the film surface resulting in an oily or powdery surface band prone to abrasion and simply being wiped off during conversion or handling.

EP 0889710 describes films, for example, made of hpmc, for making delivery capsules, but does not contemplate incorporating the active ingredient within the film matrix itself.

SUMMARY OF THE INVENTION

One object of the present invention relates to production of films containing active ingredients, using novel processes.

A active ingredient can be conveniently transported through the surface of a film via a fluid e.g. a liquid formulation, applied on one or more surfaces of the film.

In accordance with one aspect of the present invention, by way of example only, an active ingredient may be dissolved in a hydrophilic, organic system to form a homogeneous solution or dispersion. This solution or dispersion can be then applied to one or more surfaces of a non gelatin polymeric film, e.g. a dry cellulose ether film, resulting in the active ingredient and/or liquid carrier phase being transported through the surface of the 'dry' film resulting in a new film composition.

This new film composition may or may not contain all the components of the film and solution. The active ingredient may be absorbed to a varying degree in the film substrate, for example, the active ingredient may be absorbed evenly within the film substrate or it may be absorbed only near the surface of the film substrate. Variation between these 2 physical states are envisaged. Patterns or bands in the films are contemplated.

The film substrate may remain completely intact or relatively physically unchanged immediately following the incorporation process, and can be converted to any size or shape of unit dosage form. Alternatively, the film substrate may soften, liquefy or dissolve partly or fully, during the incorporation process, but nevertheless finally forming a single discrete film, after curing.

Films according to the present invention are typically made up of one or more soluble polymers or polymers which will otherwise degrade e.g. at the intended site of release of the active ingredient, e.g. in the mouth. Non readily soluble films are also contemplated, as there are situations where this could also be a possible advantage, for example in the controlled release of a medicament.

DETAILED DESCRIPTION OF THE INVENTION

One aspect of the invention relates to non gelatin films and in particular films made from cellulose ethers.

More particularly, the way in which such films incorporating one or more active ingredients can be produced is herein described.

Such films are useful for delivering a variety of agents to humans and other animals to produce a therapeutic, organoleptic or cosmetic effect.

Typically, cellulose ether films can be prepared by casting an aqueous solution of the cellulose ether onto a heated plate which drives off the water and other fugitive solvents to leave a solid film.

Suitable cellulose ethers include hydroxypropyl methylcellulose (HPMC), hydroxy propyl cellulose (HPC), Hydroxy ethyl methyl cellulose (HEMC), Hydroxy ethyl cellulose (HEC), methyl cellulose (MC), carboxy methylcellulose (CMC) (including sodium carboxy methylcellulose) and salts and derivatives of all aforesaid.

The invention is not limited to utilization of cellulose ethers for film formation nor to a film for use in connection with only treating animals or humans, but is intended to utilize any suitable non gelatin film, made in accordance with the method of the present invention, which can release an active ingredient.

It is contemplated that such films however may have particular application in the treatment of animals and humans and perhaps more particularly to the production and use of a film that is suited to ingestion or application otherwise to a human or other animal. On a wider contemplation, films according to the present invention may be of use in the cleaning or agrochemical industry, e.g. where a fertilizer or poison or surfactant is incorporated within the film.

In one preferred embodiment of the invention, a film produced by the method in accordance with the present invention is provided, such film containing an active ingredient suitable for human or animal ingestion.

In a particular aspect of the invention there is provided a film that is an effective and convenient topical or intra-cavity drug delivery system for applying and delivering controlled dosages of therapeutic agents e.g. onto or into skin or the body.

Controlled drug delivery via the skin, (e.g. in skin care or cosmetics), gynecological, vaginal, cranial, abdominal, otic, uterine, nasal, sinus, rectal, buccal, oral, ophthalmic, and wound care applications can also be achieved by the use of the product according to the present invention.

The film can be utilized for the delivery of a wide range of pharmaceutically active ingredients. Some therapeutic agents exhibit absorption problems due to solubility, degradation (e.g. in the gastro-intestinal tract), or reduction by extensive metabolism.

Without limiting the invention, examples of therapeutic agents include hypnotics, sedatives, anti-epileptics, awakening agents, psychoneurotropic agents, neuromuscular blocking agents, antispasmodic agents, antihistaminics, atiallergenics, cardiotonics, antiarrhythmics, diuretics, hypotensives, vasopressors, antitussive expectorants, thyroid hormones, sexual hormones, antidiabetics, anti tumor agents, antibiotics and chemotherapeutics and narcotics.

Cosmetically active compounds may include breath freshening agents like peppermint oil, or other flavours or fragrances used for oral hygiene and or actives used for dental and/or oral cleansing like quaternary or ammonium bases. The effect of flavours may be enhanced using flavour enhancers like menthol, tartaric acid, citric acid, and the like.

A particularly suitable cellulose ether is HPMC. To facilitate processing of the films and to increase the apparent flexibility, at least one plasticizer may be added, such as an edible plasticiser for an oral film. Plasticisers commonly used are polyols, glycols, acetins, carboxylic acids and the esters of these acids, for example polyethylene glycol, glycerin, triacetin, citric acid and triethylcitrate respectively. The plasticisers may be used individually or in combination and may be present in any desired amount, particularly from 0 to about 40 percent of the solid film and more particularly from 0 to 20 percent.

Optional ingredients may be added including, without limitation, colourants, emulsifiers, humectants, defoamers and anti block agents. Such optional components are typically added in minor amounts, to aid the processing of the film and typically are less than 10% total by weight based upon the weight of the cellulose ether component.

The base films may be made by a variety of processes, for example by dissolving or dispersing the film components in water or other solvents and drying into film form. Alternatively the film resins could be hot-melt extruded. Additionally a dispersion or solution may be directly coated or sprayed onto another edible product, such as a tablet or foodstuff and dried to form an edible film. The preferred technique is to have film solution cast and dried to produce a sheet of flexible, thin film.

The base of a film so produced can be seen to act as a 'building block' from which the final film product is produced (product film). The 'building block' film may be considered as a part-formed film, and the product film may be considered as a homogeneous film or a film formed from one or more bands, at least one band being derived from the building block. The 'building block' film according to the present invention may be considered as only a part-formed film because further mass is added later as an inevitable result of the method according to the present invention.

A uniform, flat film is found to be suitable to serve as a 'building block' film.

The next stage in the process according to the present invention is the application of a fluid, e.g. a liquid, to the film.

According to an aspect of the invention, by way of example, application of a solution, suspension or micro-emulsion containing the active ingredient (hereinafter referred to as liquid), onto to one or more surfaces of the 'building block' film to produces a new film or product film.

In one aspect of the present invention, complete homogeneity is achieved in the product film.

In another aspect of the present invention, a product film having variations in physical quality and/or chemical composition is produced.

The result achieved depends on the chemicals and conditions used in the process according to the present invention.

In an example, one or more surfaces of a 'dry' cellulose ether film are coated.

In one embodiment of the invention, for e.g. case of processing, application of a liquid to one side of the film is sufficient, because, the active ingredient, once transported into the film, can form part of the complete film composition. Such method of application of an active ingredient can result in film products which have beneficial gradations in concentration of the active ingredient in the final film product. Also, such application can result in a robust film containing active ingredient(s) and which is suitable for a variety of applications. Films produced by such a method are physically a single film, and may comprise 2 or more 'bands' or 'areas' (hereafter referred to as 'bands'), such bands having a degree of polymeric interaction with the film and/or one another, such interactions are great enough that the film still exists as discrete a single film.

The association of the fluid, e.g. liquid with the building block film, and subsequent curing, as necessary, forms the product film.

In one aspect of the invention, the product film comprises a single homogeneous polymer with the active ingredient evenly dispersed throughout the film, or in a concentration gradient within the film.

In another aspect of the invention, the product film comprises 2 or more bands associated with one another to a greater or lesser degree, with the active ingredient dispersed within particular band(s) only, or, to an extent, deposited on the surface (internal or external) of one or more bands in the product film.

It is to be understood that the product film comprises a single physical film. Such product film being robust for both storage and application, and which maintains sufficient integrity as such, for commercially viable use.

The fluid and the building block film associate with one another to an extent where the association results in more than adhesion.

To describe the product film in another way, the association of fluid and film results in a product film which, because of its own physical properties, cannot, by a mechanical process, be split back into the original components (with their attendant compositions) from which it was formed i.e. the liquid (or cured result thereof) and the building block film. Therefore, the product film possesses a degree of structural homogeneity between bands in the film, if such bands indeed are formed during the process according to the present invention.

It is also to be understood that the association of the liquid with the building block film to form a product film results in a single film which may or may not have more than one band associated with it. These bands may comprise e.g., differences in polymer chemistry or polymer quality or differences in concentration levels of active ingredient. Indeed, these bands may consist of any differences or variations occurring within the film as a result of carrying out the process according to the present invention, in order to form the product film.

Appropriate means of liquid application onto the film substrate includes extrusion, roller application, pouring and leveling by doctor blade or knife, spraying, brush painting or wiping. As long as the surface application is uniform, the active ingredient will be evenly applied onto the film substrate. Preferably, but not essentially the liquid comprises at least one polymer which is compatible with the "building block" film. The final "coated" film composition may be conveniently left at ambient temperature and humidity in order to allow the assimilation of the "surface layer", if applicable, to be transported into the body of the film substrate. To accelerate the process, the film substrate can be heated up to temperatures of 80°C or the complete film transferred into a warm oven of similar temperature for a short period of time. A measure of when incorporation of active ingredient is complete is when the film surface becomes touch dry.

In many cases, the liquid carrying the active ingredient, contains non-fugitive materials, a new film composition is produced. There maybe instances where fugitive solvents are used in the liquid carrier but this would primarily be to accelerate the process of active ingredient transport.

As a further embodiment of the invention, two or more active ingredients or materials, may be selectively transported into the film substrate. In this instance, one active ingredient may have an affinity to move into the film substrate and the other may remain on the surface of the film, as a descrete band. An example of this would be a liquid formulation containing an active ingredient such as Ibuprofen and excipient such as sucrose. The two materials could be dissolved into a liquid formulation, which when applied as the transport medium to a film substrate, would result in the Ibuprofen moving into the core of the film and the sucrose, which has no affinity to be transported, remaining as a distinct surface layer on the film. This selectivity has a number of advantages, for example, the application of taste masking materials to a film surface.

Typical liquid materials which can be used to dissolve active ingredients or other compounds and act as selective transport mediums would primarily be polar liquids, which are predominantly water soluble or partially water soluble. These are mainly organic but inorganic materials such as water could also be used.

For a liquid to function as a suitable transport medium, compounds containing one or more of the following functional groups or compounds in its molecular structure, may be found suitable:-

- Hydroxy
- Carboxy
- Amino
- Carboxamido
- Epoxy
- Oxo or keto
- Cyano
- Benzyl
- Alkoxy or aryloxy
- Furans, Pyrroles and thiophenes
- Sulfoxide and sulfone
- Quaternary nitrogen
- Pyridine
- Anhydrides
- Esters and lactones

With a relatively broad range of polar organic liquid carriers to select from, it is possible to choose one or more compounds to act as a transport medium for a active ingredient. The active ingredient would ideally need to be soluble in the transport medium to work within this invention. Speed of active ingredient transport and end user application are

controlled by the careful selection of polar liquids. For example fast transport of active ingredient into the film can be controlled by the molecular weight and functional groups within the liquid transport medium. Inevitably choice of liquid carrier is dictated by the end user application of the final film product, for example whether it can be safely ingested or, for topical applications, its acceptability for use on skin.

There is no limitation as to which type of medicament, drug, active ingredient, flavour, fragrance or agent which can be used in this final step of the process. Those skilled in the art of formulation science will choose a suitable polar liquid or formulation to work in conjunction with suitable cellulose film to achieve the desired application.

In another aspect of the present invention there is provided a method for producing a film incorporating active ingredients, wherein the one or more active ingredients are not exposed to the harsh conditions which may be necessary to produce a film e.g. the 'building block' film. A milder process, according to the present invention is then used to introduce the active ingredient to the film, advantageously avoiding subjecting the active ingredient to any unfavourable conditions in film production. This then facilitates the use of films which would otherwise be unsuitable for incorporating certain active ingredients, due to the initial conditions of film production. New useful film formulations are therefore contemplated.

The incorporation of active ingredients in a film in accordance with the invention also allows films to be produced which have active ingredients effectively applied and incorporated within the film in specific patterns. This also gives rise to the opportunity in further treating the film so that e.g. drugs can be release in a timed manner (e.g. parallel or sequential timing or both). For example, a film having a certain pattern of drug applied to it, can then be folded in a certain manner and fixed that way to produced a dosage form, such that certain drugs may be hidden deeper within the dosage form and are released later in time than those closer to the surface of the dosage form. In a similar way, films may be coiled, compressed and folded in a zig-zag manner or simply set in a multi-film ply formation, so form discrete calculated 'thinking' dosage forms.

Also contemplated are dosage forms utilizing film made according to the present invention. For example a powder slug, tablet may be enrobed by such film or a liquid filled pharmaceutical capsule may be made for this film. It is easily contemplated e.g. that there may be a situation wherein a liquid filled capsule contains a drug which is a stomach irritant but unfortunately needs to be release within the stomach. A film according to the present invention may be so designed as to incorporate an anti-inflammatory or ant acid. A capsule could thus be designed to release a drug (which is a stomach irritant) into the stomach, but which before such release, the capsule wall made from the film according to the present invention, itself releases an anti inflammatory or ant acid to reduce the pain in the stomach.

Examples of the preparation and composition of film material containing medicament are as follows:

Example 1

Solution A)

Hydroxypropyl methylcellulose*	10.0%	100g
Glycerin	1.0%	10g
Triethyl citrate	1.0%	10g
Purified water	88%	880g

*Methocel E50 LV Premium (ex Dow chemicals)

The hydroxypropyl methylcellulose (HPMC) was carefully added to the purified water at 80°C with stirring. This was followed by the addition of glycerin. The solution was cooled to 30°C, maintaining agitation to produce a colourless, viscous solution. Triethyl citrate was slowly added to the cooled solution with gentle mixing to produce a clear, viscous solution.

The solution was allowed to stand for 24 hours to allow it to naturally de-aerate. This resulting film forming solution was used to prepare films using an adjustable doctor blade (R.K. Print Coat Instruments Ltd, Royston, Herts). The gap on the doctor blade was set at 1.6mm and used to draw down the solution onto a glass plate, which was then air dried for 24 hours at 25°C, 45 % R.H.

Once dry this substrate film (film A) had evenly applied to its surface (surface which was in contact with the glass plate) a solution B of the following compositions:-

Solution B)

Ibuprofen	13%	13g
Propylene glycol	56%	56g
Triacetin	27%	27g
HPMC (Methocel E15 LV Premium)	4%	4g

The HPMC was added to propylene glycol heated to 80°C. The mixture was stirred until a solution was formed then the triacetin was added and stirred to form a clear solution. This was cooled to 40°C and then Ibuprofen was added. The mixture was stirred until all the Ibuprofen had dissolved resulting in a clear viscous solution. (Solution B). This solution, called the selective transport medium will be used in the next stage of the process.

Solution B) is evenly applied onto the surface of film A) using a doctor blade knife at a rate of 15 grams per sq metre of Solution B to 100 grams per sq metre of film A. This

results in a total film mass of 1.15g.s.m. The resulting film is left at room temperature for 30 minutes until the surface is touch dry and the selective transport medium (STM) and ibuprofen has reconstituted itself into the final film (film C).

The final composition of film C, which is a combination of film A and solution B is now:

	%w/w
HPMC	73.1
Glycerin	7.2
Triethyl citrate	7.2
Propylene glycol	7.3
Triacetin	3.5
Ibuprofen	1.7

The dry film can be converted into small units for use in oral administration.

Other examples of polar liquids mixtures which can be used to dissolve Ibuprofen and act as the selective transport medium are tabulated in table 1 (formulations 1-9). Each of the resulting solutions can be applied at the same rate as Solution B) in example 1 to the same film A, resulting in a different film composition in each case all contain the Ibuprofen as the medicament.

Table 2 demonstrates similar formulations (10-18) but in this case the medicament is a simple flavour.

Table 3 illustrates a range of formulations (19-23) based on ascorbic acid (vitamin C) as the medicament.

Table 1

Formula	1	2	3	4	5	6	7	8	9
Ingredient									
Ibuprofen	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Benzyl alcohol	85.5								
Isobutanol		67.5							
Propylene Glycol			57.6						
1,4 - Butyrolactone				85.5					
N-Methyl - 2 Pyrrolidone					85.5				
Ethanol						67.5			
Triacetin			27.9						
Monoacetin							85.5		
Lactic acid**								68.4	
Glacial acetic acid									58.5
Water		18.0				18.0		17.1	27.0
HPMC*	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5

*Methocel E50 LV Premium, ex Dow Chemicals (used as a viscosity aid)

Table 2

Formula	10	11	12	13	14	15	16	17	18
Ingredient									
Cherry Flavour +	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
Benzyl alcohol	76.0								
Isobutanol		60.0							
Propylene Glycol			51.2						
1,4 - Butyrolactone				76.0					
N-Methyl - 2 Pyrrolidone					76.0				
Ethanol						60.0			
Triacetin			24.8						
Monoacetin							76.0		
Lactic Acid**								60.0	
Glacial acetic acid									52.0
Water		16.0				16.0		16.0	24.0
HPMC*	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0

+ Cherry flavour ex F.D. Copeland & Sons Ltd

Table 3

Formula	19	20	21	22	23	24
Ingredient						
Ascorbic Acid	5.0	4.0	5.0	4.5	5.0	40.0
Citric acid	42.8					
Lactic acid**		60.0				
Propylene Glycol			62.7			
Benzyl alcohol				82.0		
Iso-butanol					71.3	
Water	47.5	32.0	29.0	9.5	19.0	55.0
HPMC*	4.7	4.0	3.3	4.0	4.7	5.0

** Lactic acid provided in the form of a 90% solution (Purac PH90™, ex Purac Biochem)

Each Formula (1 to 24) takes a finite time to incorporate and consolidate the medicament into a cellulose ether film substrate. Table 4 illustrates the length that each formula takes to constitute itself into a HPMC film.

The time value is based on each formula being applied at 25 gsm on a substrate HPMC film, 110 micros thick and around 150 gsm in weight. Applications of each liquid formulation were performed by means of a doctor blade. Conditioning environment was 21°C, 45% R.H. and the dry point was assessed when the applied surface became touch dry.

The resulting films were clear and free from particulate or crystalline matter.

Table 4

Formula	Time Min	Formula	Time Min	Formula	Time Min
1	3	10	2	19	2
2	1	11	1	20	2
3	5	12	8	21	6
4	5	13	2	22	3
5	2	14	3	23	2
6	2	15	2	24	3
7	10	16	15		
8	17	17	10		
9	3	18	3		

Formulae 1 to 18 were applied to a film of the following composition:

	% w/w
HPMC*	80
Glycerin	10
Triethyl citrate	10

Formulae 19 to 24 were applied to a film of the following composition:

	% w/w
HPMC*	77
Glycerin	3
Citric acid	20

(Table 5) illustrates examples of formulations which behave as selective transport mediums. All contain active ingredients which can be incorporated into HPMC film

*Methocel E50 LV Premium, Ex Dow Chemicals

Table 5

Ingredient	Formula	25	26	27	28	29	30
Ibuprofen		25					
Ascorbic Acid			40.0				
Menthol				50.0			
Dextromethorphan HBr					10.0		
Alpha Tocopherol						50.0	50.0
Propylene Glycol		75			90		
Ethanol						50.0	
Benzyl alcohol				50.0			50.0
Water			58.0				
HPMC*			2.0				
Dry Point (Mins)		7	5	10	7	2	4

*Methocel E50 LV Premium, Ex Dow Chemicals

Each formula (25 to 30) was applied to the surface of a substrate HPMC film at a rate of 25 g.s.m. the substrate film was 115 microns thick and around 160 g.s.m. in weight.

Application was performed by means of a doctor blade and the liquid formulation was allowed to consolidate itself into the HPMC film substrate. Conditioning environment was 21°C, 45% RH. The dry point was recorded in Table 5.

Film substrate composition was:-

HPMC *	77%
Glycerin	3%
Citric acid	20%

The final films remain clear and free from particulate or crystalline matter.

Description of drawings

The following drawings are intended to further describe the invention, by way of example only and are not intended to limit the invention in any way.

Fig 1 shows, according to the present invention, how a liquid can be applied to a film.

Figures 2-4 shows various stages in the assimilation of e.g. active ingredients.

Figure 5 shows an arrangement in which a product film may be folded to form a dosage form.

Figure 6 shows cross section of a set of fused product films and figures 7 and 8 show the multiple production of product films, such films being further involved in fusion, this time fusion to one another, to form a further product film.

Figure 10 shows a coiled film with concentration gradient detailed.

Claims

- 1) A method of producing a non gelatin film comprising one or more active ingredients, comprising:
 - a) forming a non-gelatin polymeric film, with or without active ingredients incorporated therein
 - b) applying a fluid to one or more surfaces of the film, said fluid incorporating at least one active ingredient
 - c) allowing the fluid applied to cure and associate with the film, to result in either:
 - d) one or more bands formed on, about or within a film, said band being at least partially incorporated within the film, so forming a single film product

Or

the fluid being absorbed within a film, wholly or partially, and forming a single film product.

Or

a combination of both of the above

- 2) A method according to claim 1 wherein the non gelatin film produced, comprises one or more bands which associate with one another to a lesser or greater degree to form a partially or wholly polymerically homegenious film.
- 3) A method according to claim 1 wherein the fluid is a liquid
- 4) A method according to claim 1 whereby one or more substances are also deposited on the film surface.
- 5) A method according to claim 1 wherein the active ingredient in the liquid is transported onto or into the film during either or both steps b) or c) of claim 1.

- 6) A method according to claim 2 wherein the active ingredient is selectively transported.
- 7) A method according to claim 1 wherein the non gelatin film comprises a cellulose ether film.
- 8) A method according to claim 1 wherein the non gelatin film comprises one or more of the following polymers:

hydroxypropyl methylcellulose (HPMC),
hydroxy propyl cellulose (HPC),
hydroxy ethyl methyl cellulose (HEMC),
hydroxy ethyl cellulose (HEC),
methyl cellulose (MC),
carboxy methylcellulose (CMC)
sodium carboxy methylcellulose

and salts and derivatives of all aforesaid.

- 9) A method according to claim 1 wherein the liquid comprises a same or similar polymeric material as to which forms the non gelatin film
- 10) A method according to claim 1 wherein the liquid comprises a material which chemically or physically compatible with the material which forms the non-gelatin film
- 11) A method according to claim 1 wherein the active ingredient is transported
- 12) A method according to claim 1 wherein the active ingredient is transported from the liquid to the film
- 13) A method according to claim 1 wherein the active ingredient has a higher affinity for the liquid than the film
- 14) A method according to claim 1 wherein the film active ingredient has a higher affinity for the film than the liquid
- 15) A method according to either of both of claims 13 and 14 wherein 2 or more active ingredients have the same or differing affinities for the film and liquid
- 16) A film produced by the method in claim 1

- 17) A film comprising 2 or more layers wherein one or more active ingredients are present in the same or differing quantities in relationship to the differing layers.
- 18) A film according to claim 1 wherein one or more active ingredients are present in the film and which have concentration gradients associated with one or more bands or patterns within the film.
- 19) A film produced according to claim 1 wherein the active ingredient continues move or be transported after the curing stage.
- 20) A film according to claim 1 wherein one or more layers associate with one another to a lesser or greater degree to form a level of polymeric homogeneity
- 21) A film according to any previous claim, which is coiled
- 22) A film according to any previous claim which is folded in a zig-zag formation
- 23) Layers of film formed from films according to any previous claim
- 24) A film produced in accordance with any previous claim wherein the film is packaged to form a dose unit
- 25) A sheet of film produced in accordance with any previous claim wherein the film has liquid according to claim 1 applied to it, on one or both sides, and on opposing/adjacent areas or non-opposing or adjacent areas or overlapping areas, to form a pattern.
- 26) A dosage form produced from a sheet of film as claimed in claim 25 wherein the pattern produced with respect to the film provides advantageous characteristics
- 27) As dosage form as claimed in claim 26 wherein the advantageous characteristics are storage or active ingredient release.
- 28) A Dosage form derived from a film produced by a method in any previous claim or a film claimed in any previous claim
- 29) Use of a film as claimed in any previous claim wherein the film is placed on the tongue of a human or animal and the active ingredients are released in a convenient manner as the film disintegrates.
- 30) A tablet, powder slug or capsule made from or coated, enrobed or encapsulated with a film according to the present invention

FIG 1

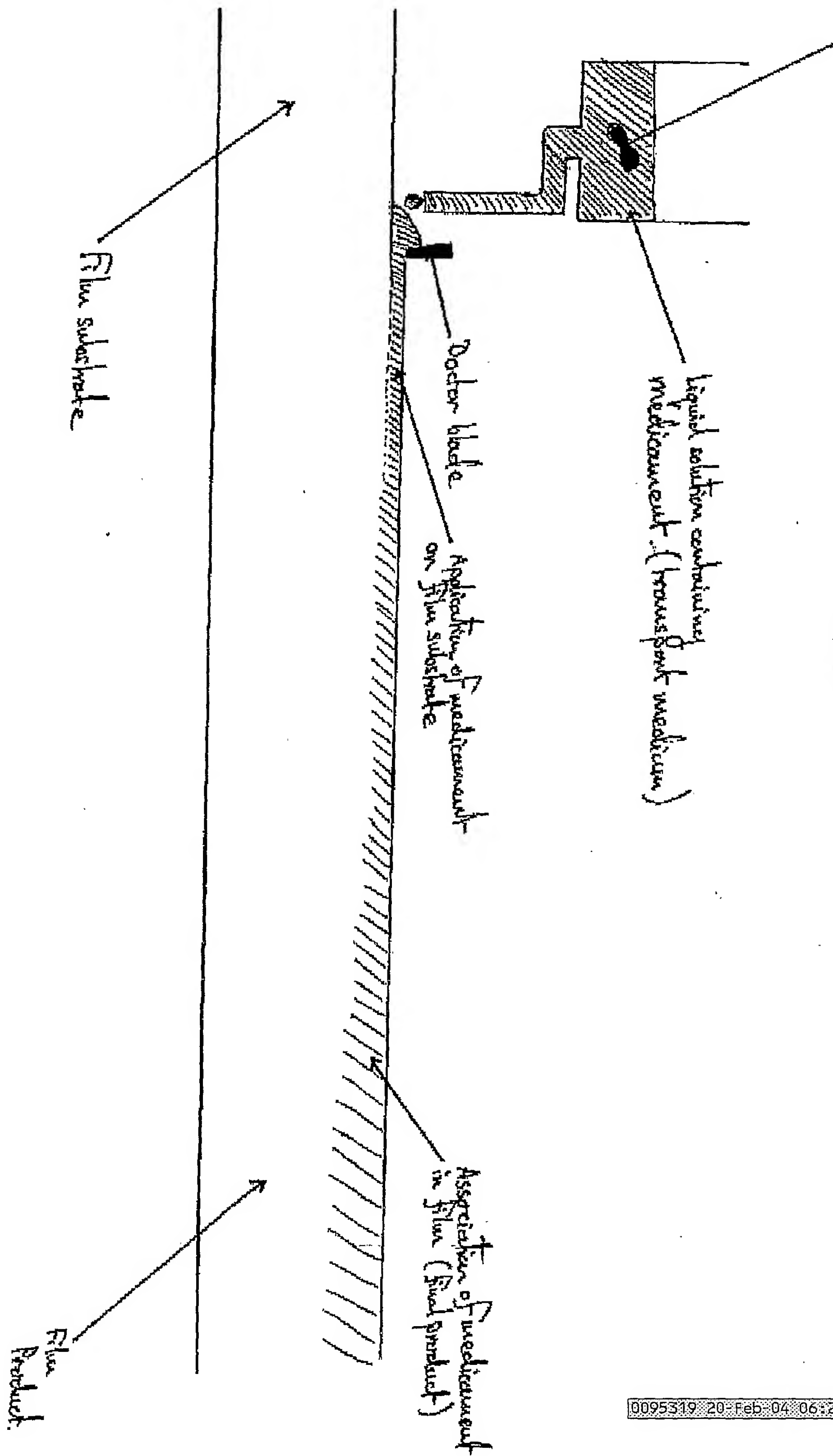


Fig 2.

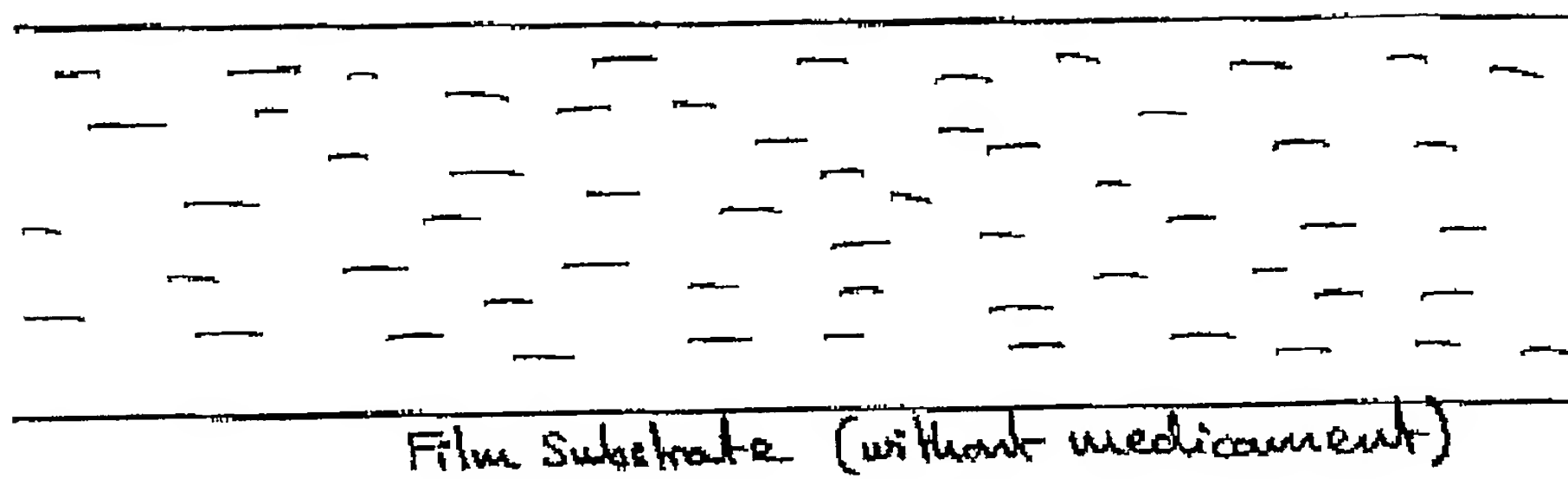


Fig 3.

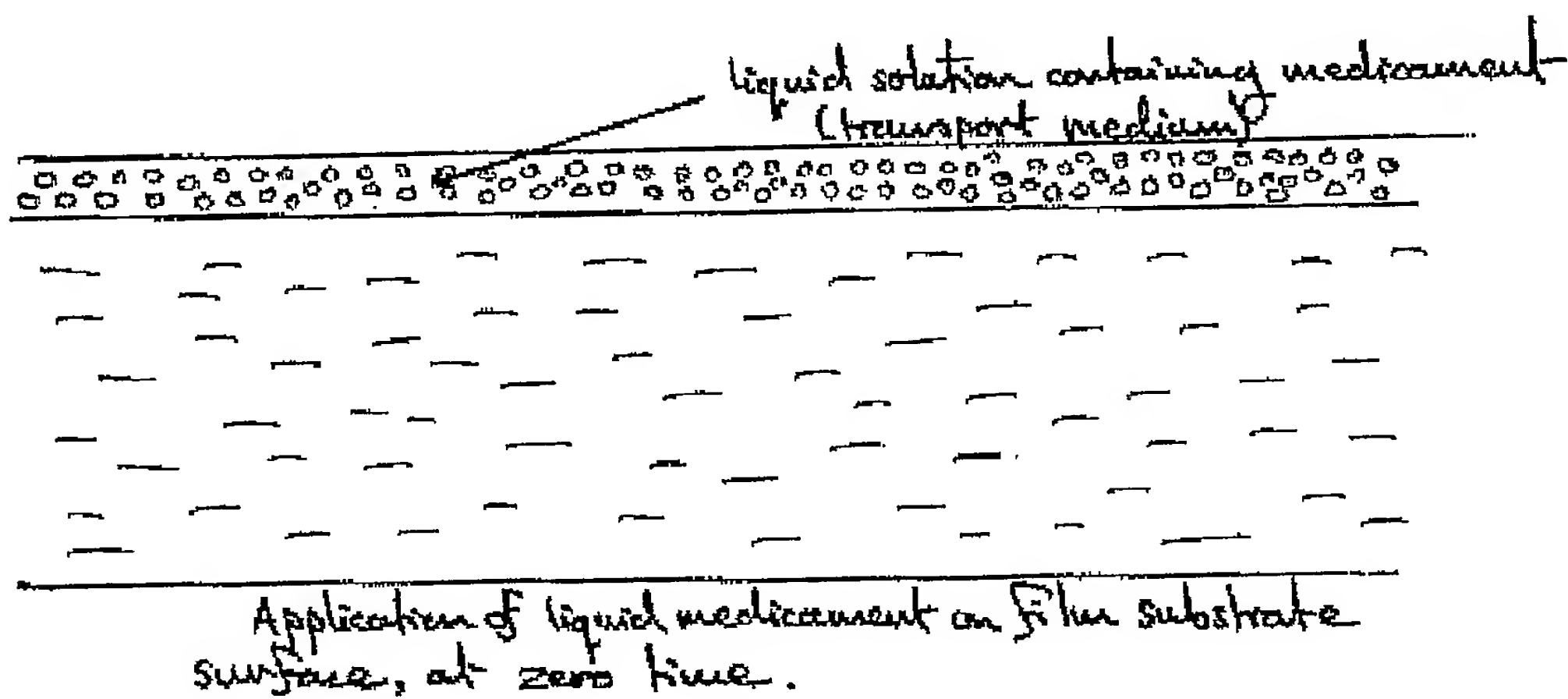


Fig 4

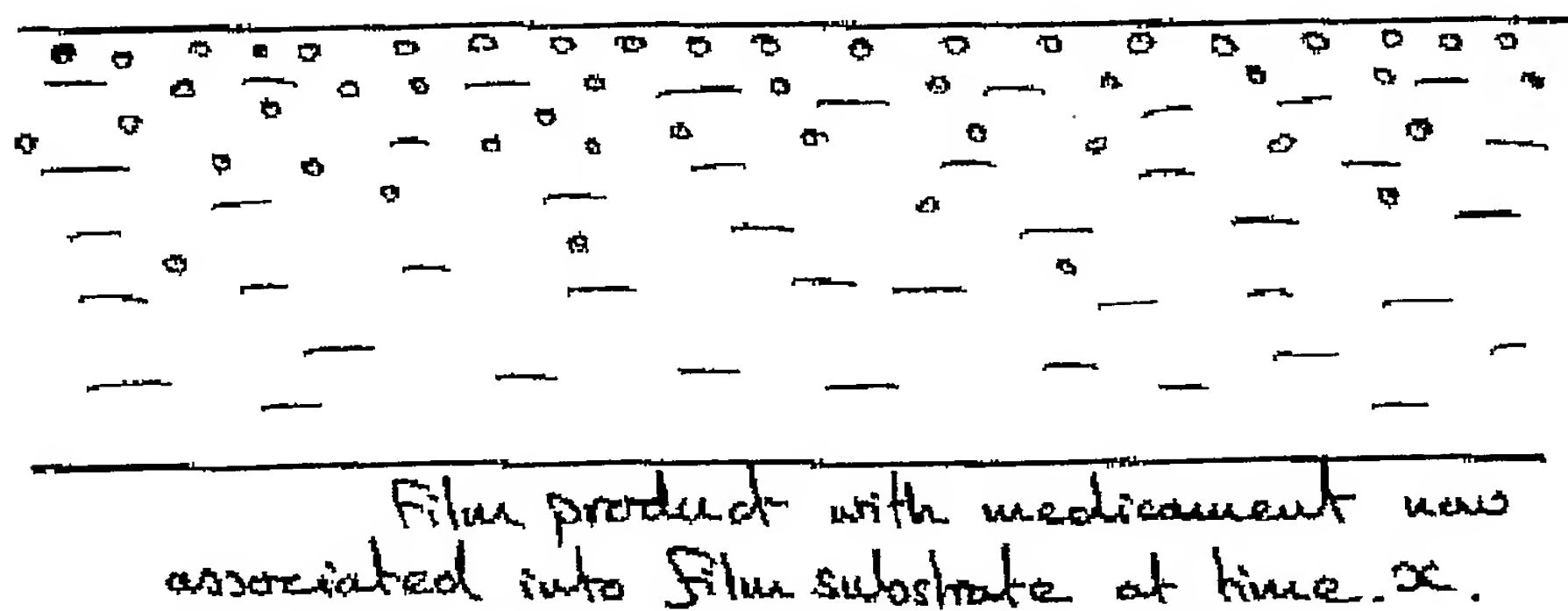


Fig 5.

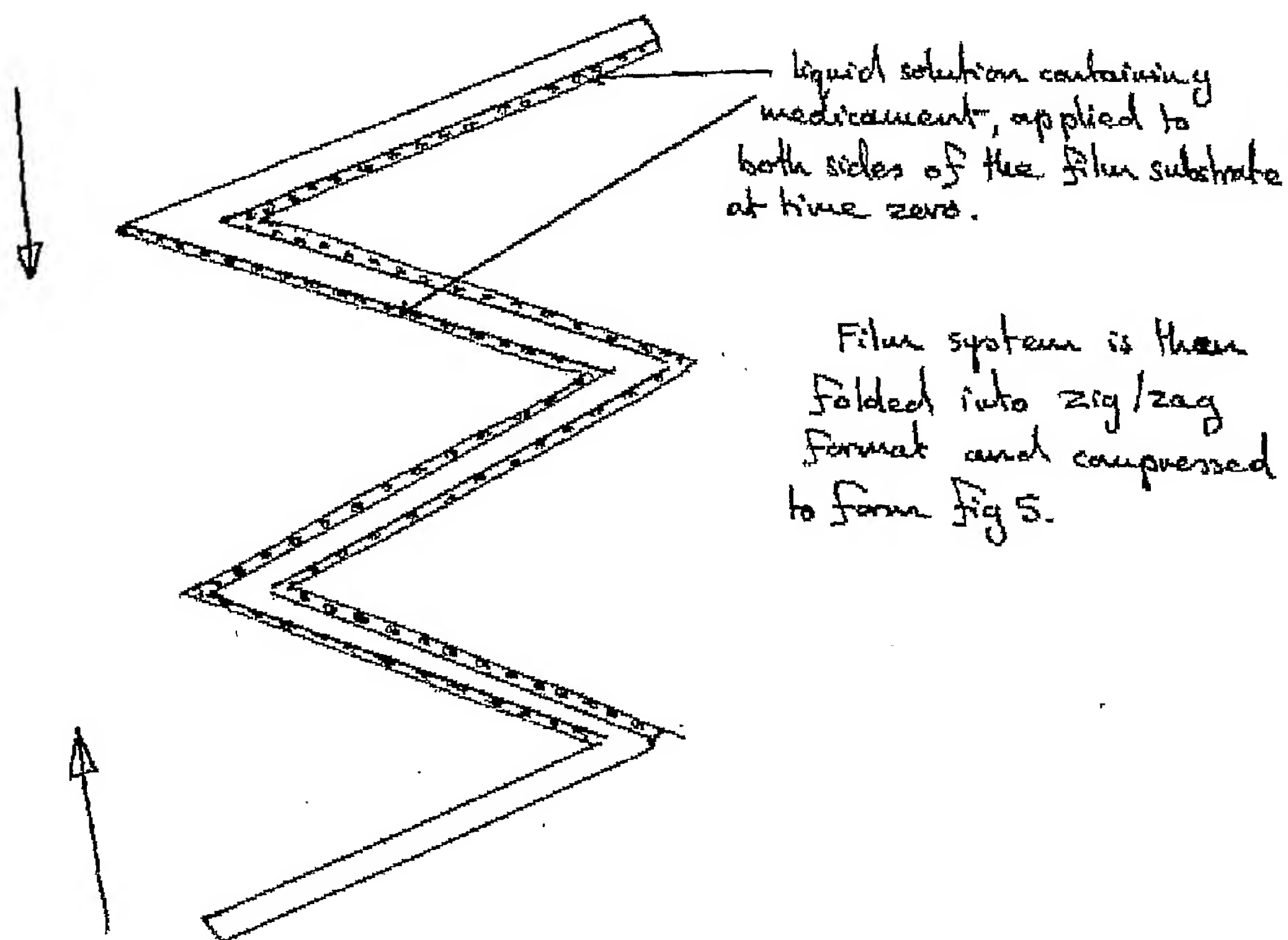
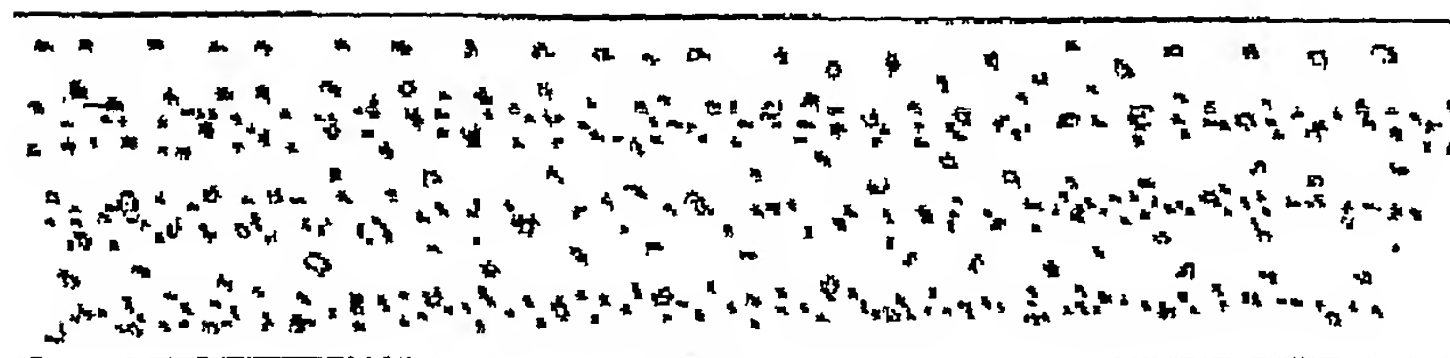


Fig 6.



Compressed sections of film product fused/laminated together to form a solid composite with medicament striated and distributed within product.

Fig 7

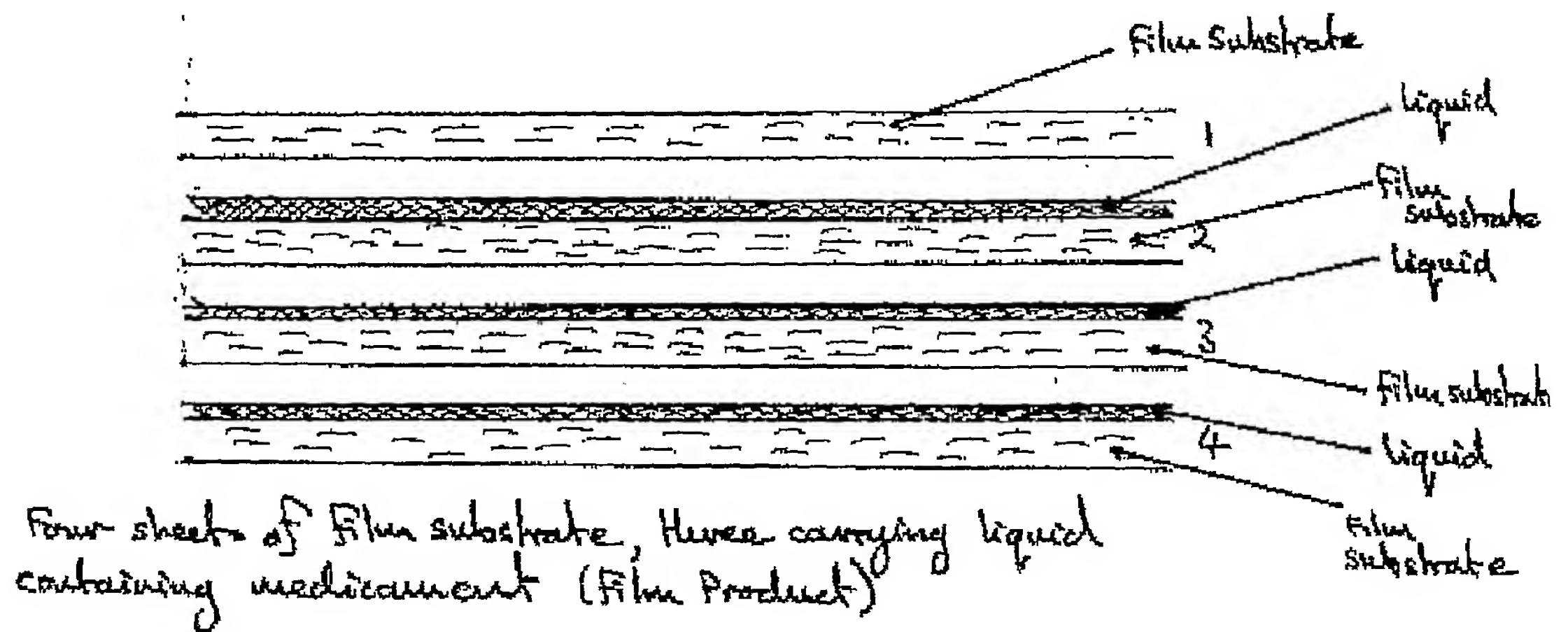
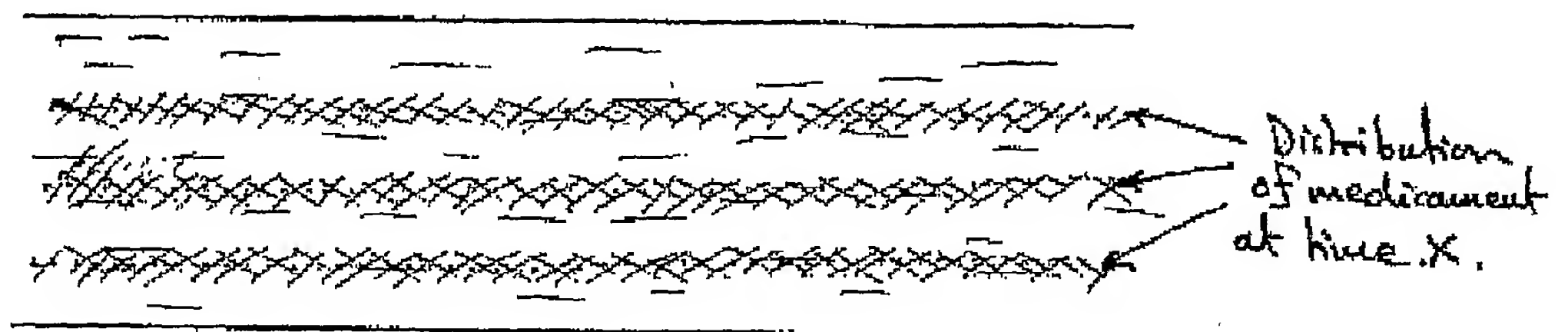


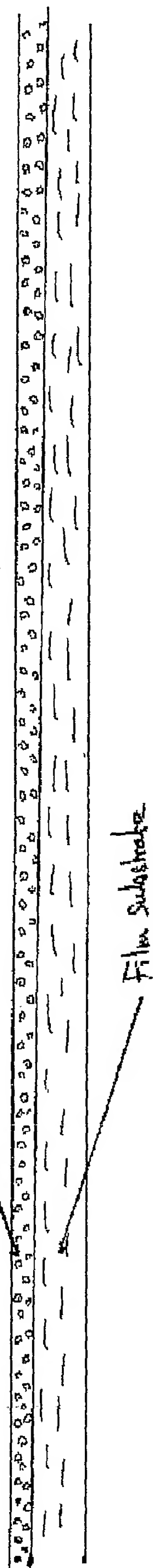
Fig 8



Film sections compressed together causing Film Product to fuse/laminate to form a solid composite with medicament striated and distributed within the final product.

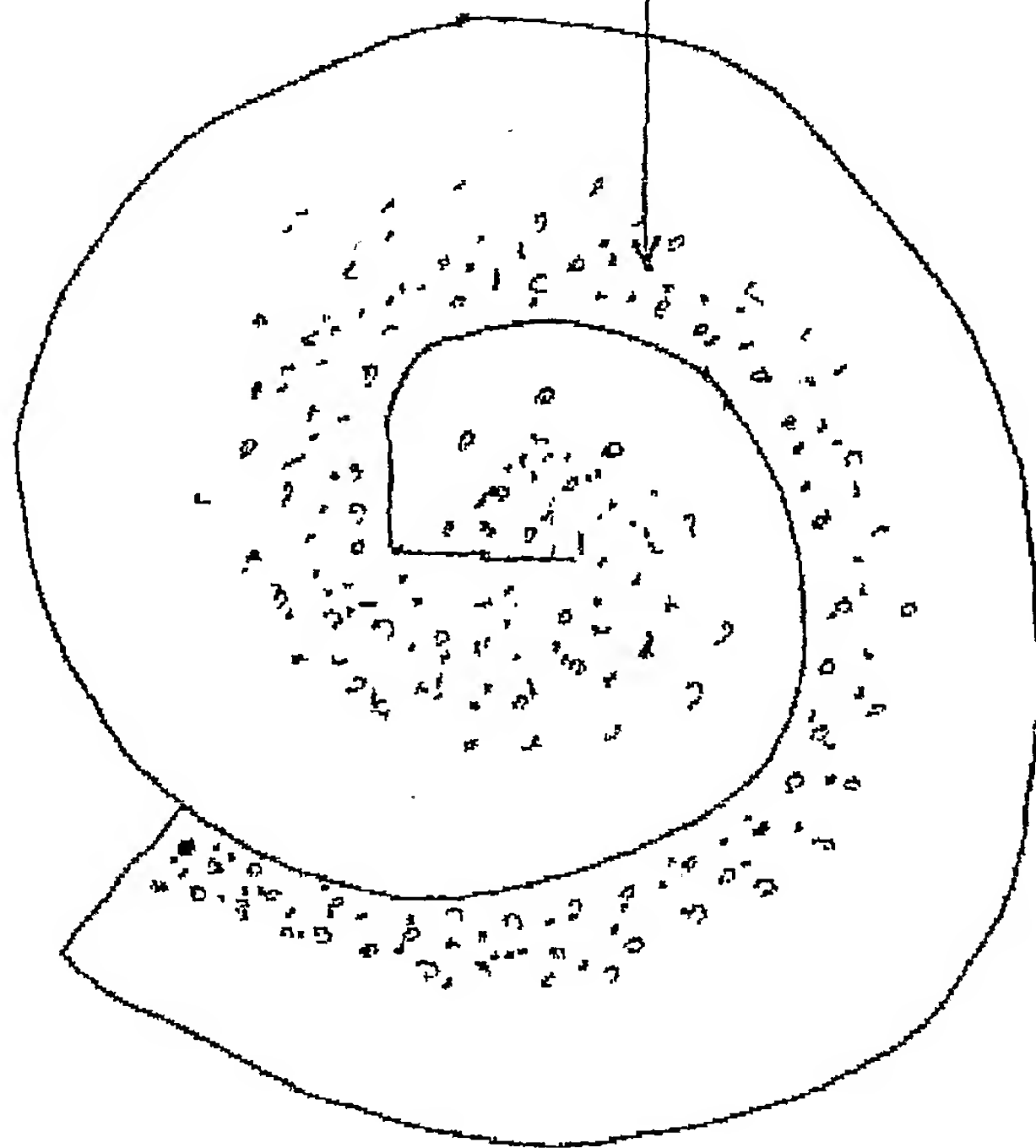
Fig 9.

Liquid solution containing medicament



Film Substrate

Film product coiled with liquid solution containing medicament inner most. Film mass fuses together and medicament diffuses in and around the core



general position of medication, situated within the coil of the film mass.

Fig 10.